

Alpha 1201362

SOLAR/1034-79/03

Monthly Performance Report

ALPHA CONSTRUCTION CO.

MARCH 1979



U.S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

ALPHA CONSTRUCTION COMPANY

MARCH 1979

I. SYSTEM DESCRIPTION

The Alpha Construction Company site is a single-family residence in Canton, Ohio. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 428 square feet. The array faces south at an angle of 37 degrees to the horizontal. Air is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Solar energy is stored in the basement in a 510-cubic-foot bin containing 50,100 pounds of rock. The bin has concrete block walls and polyurethane insulation. Preheated city water is stored in an 80-gallon preheat storage tank and supplied, on demand, to a conventional 52-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a heat pump in the air-handling unit provides auxiliary energy for space heating. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has four modes of solar operation.

Mode 1 - Collector-to-Space Heating: This mode activates when the collector is operating, a space heating demand exists, and the plenum temperature at the top of storage is above the minimum value suitable for supplying heat to the house. Heated air is circulated through the house by the air-handling unit before being returned to the collector.

Mode 2 - Collector-to-Storage: This mode activates when the collector is operating and there is either no demand for space heating or the plenum temperature at the top of storage is below the minimum value for supplying heat to the house.

Mode 3 - Storage-to-Space Heating: This mode activates when there is a demand for space heating, and the plenum temperature at the top of storage is above the minimum value for supplying heat to the house. The fan in the air-handling unit draws air from the bin, circulating it through the house and back to storage.

Mode 4 - Domestic Water Preheating: This mode activates when the temperature at the top of the collector indicates a minimum value for hot water heating, which must be above the plenum temperature at the bottom of storage.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was unoccupied during the month of March; however, the solar energy system operated continuously during the month. Solar energy satisfied 14 percent

- 1001 COLLECTOR PLANE TOTAL INSOLATION
- ▶ T001 OUTDOOR TEMPERATURE
- ▶ T600 INDOOR TEMPERATURE

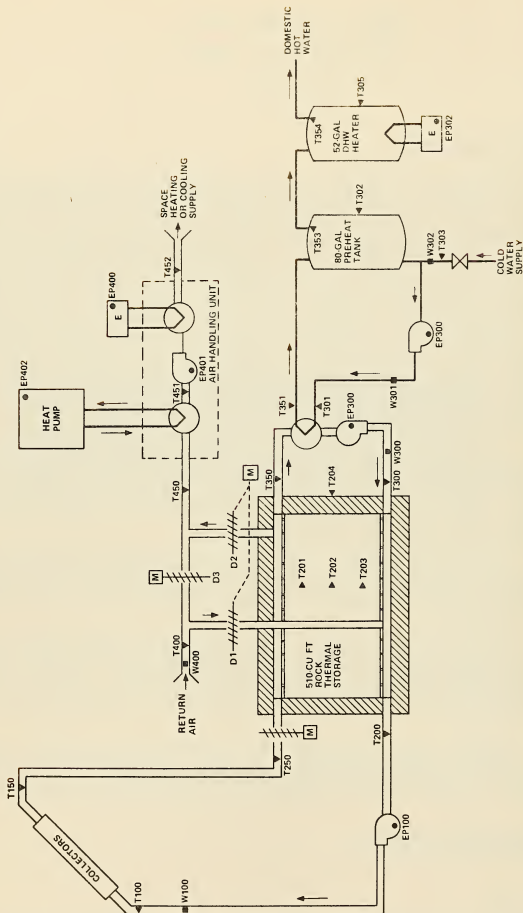


Figure 1. ALPHA CONSTRUCTION CO. SOLAR ENERGY SYSTEM SCHEMATIC

of the space heating requirements. The solar energy system provided an electrical energy expense of 0.35 million Btu.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 15.2 million Btu for a daily average of 1141 Btu per square foot. This was nearly identical to the estimated average daily solar radiation for this geographical area during March of 1135 Btu per square foot for a south-facing plane with a tilt of 37 degrees to the horizontal. The average ambient temperature during March was 41°F as compared with the long-term average for March of 36°F. The number of heating degree-days for the month (based on a 65°F reference) was 757, as compared with the long-term average of 893.

THERMAL PERFORMANCE

System - During March the solar energy system performed poorer than expected. The expected performance was determined from a modified f-chart analysis using measured weather and subsystem loads as inputs. Solar energy collected was 4.4 million Btu versus an estimated 3.0 million Btu. Solar energy used by the system was estimated by assuming that all energy collected would be applied to the load. Actual solar energy used was 0.51 million Btu. System total solar fraction was 14 percent versus an estimated 100 percent.

Collector - The total incident solar radiation on the collector array for the month of March was 15.2 million Btu. During the period the collector loop was operating the total insolation amounted to 13.0 million Btu. The total collected solar energy for the month of March was 4.4 million Btu, resulting in a collector array efficiency of 29 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 4.1 million Btu, while solar energy delivered from the collector array directly to the loads amounted to 0.14 million Btu. Energy loss during transfer from the collector array to storage and loads was 0.16 million Btu. This loss represented 4 percent of the energy collected. Operating energy required by the collector loop was 0.29 million Btu.

Storage - Solar energy delivered to storage was 4.1 million Btu. There were 0.37 million Btu delivered from storage to the space heating subsystem. Energy loss from storage was 3.8 million Btu. This loss represented 91 percent of the energy delivered to storage. The storage efficiency was 9 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 93°F.

DHW Load - Because the home was unoccupied in March, there was no requirement for hot water. A total of 0.14 million Btu of solar energy was used to heat the water in the preheat tank. The DHW subsystem consumed a total of 0.21 million Btu of operating energy, resulting in an energy expense of 0.21 million Btu. An additional 0.31 million Btu of auxiliary electrical energy was used by the hot water tank to maintain the temperature. The average temperature of the water in the DHW tank was 119°F.

Space Heating Load - The space heating requirement for the unoccupied home during March was 2.6 million Btu. The solar energy system provided 0.37 million Btu or 14 percent of this requirement. The remaining load of 2.2 million Btu was satisfied by an auxiliary electrical heat pump and an electrical heating element at an electrical energy consumption of 0.79 million Btu. The space heating subsystem consumed an additional 0.44 million Btu of operating energy. A net electrical energy savings of 0.14 million Btu was obtained from the solar portion of the space heating subsystem.

OBSERVATIONS

The solar energy site was unoccupied during March and presented a minimum space heating load due to a thermostat set at 57°F, except during periods of open house. The daily average insolation was nearly identical to the long-term average for March, while the average temperature was 5°F warmer than the long-term average. Only 0.37 million Btu of the collected solar energy was transferred to heat the conditioned space in a controlled manner.

There was an uncontrolled solar energy escape of 3.8 million Btu into the conditioned space and outside environment which caused storage to lose the rest of the collected solar energy.

The DHW preheat subsystem expended more operating energy than the amount of solar energy transferred to the DHW preheat tank. The configuration of the DHW subsystem preheat loop permits solar energy transfer to the preheat tank only during times when collection is occurring. A separate air blower is required by this subsystem which adds significantly to operating costs. Frequently the heated air from the collector at the beginning or end of the collection period is cooler than the temperature of the water in the preheat tank. The operation of the preheat loop which is independent of the water temperature in the tank extracts energy from the tank during these periods. During periods of heating from storage, an induced air flow occurs through the DHW preheat loop. A portion of the unmeasurable energy loss from storage may escape through this air path. During the cooling season the storage subsystem must be operated in order to operate the DHW preheat subsystem. Energy that is not utilized by the DHW subsystem is collected in storage. Energy losses from storage to the conditioned space add to the cooling loads and reduce any savings obtained by the DHW subsystem.

ENERGY SAVINGS

The solar energy system incurred a total electrical energy expense of 0.35 million Btu. The space heating subsystem provided a savings of 0.14 million Btu, but this was eliminated due to the expense of operating the DHW subsystem (0.21 million Btu) and the collection subsystem (0.29 million Btu).

III. ACTION STATUS

Boeing conducted a preliminary air-mapping survey in October which revealed significant leaks in the energy collection and storage subsystems. Sealing the accessible leaks would only provide minimal improvement.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: MARCH, 1970

SOLAR/1034-70/03

SITE/SYSTEM DESCRIPTION:

THE SOLAR ENERGY SYSTEM PROVIDES FOR SPACE HEATING OF A SINGLE FAMILY DWELLING. THE SYSTEM ALSO PROVIDES ENERGY TO AN 80 GALLON HOT WATER PREHEAT TANK. STORAGE IS 110 CUBIC FEET OF GRAVEL. A HEAT PUMP AND ELECTRIC STRIP HEATERS PROVIDE AUXILIARY SPACE HEATING.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE
AVERAGE BUILDING TEMPERATURE
FCS SOLAR CONVERSION EFFICIENCY
FCS OPERATING ENERGY
TOTAL SYSTEM OPERATING ENERGY
TOTAL ENERGY CONSUMED

15.11 MILLION BTU
2536 BTU/SQ. FT.
4.44 MILLION BTU
10.18 BTU/SQ. FT.
55 DEGREES F
50 DEGREES F
0.02 MILLION BTU
0.295 MILLION BTU
0.624 MILLION BTU
6.449 MILLION BTU

SUBSYSTEM SUMMARY:

LOAD
SOLAR FRACTION
SOLAR ENERGY USED
OPERATING ENERGY
AUX. THERMAL ENERGY
AUX. ELECTRIC FUEL
AUX. FOSSIL FUEL
ELECTRICAL SAVINGS
FOSSIL SAVINGS

HEATING
2.576
14
0.372
0.435
0.623
0.702
N.A.
0.142
N.A.
0.381

COOLING
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.

SYSTEM TOTAL
2.576 MILLION BTU
14 DEGREE F
0.538 MILLION BTU
0.824 MILLION BTU
0.616 MILLION BTU
1.104 MILLION BTU
N.A. MILLION BTU
-0.347 MILLION BTU
N.A. MILLION BTU

SYSTEM PERFORMANCE FACTOR:

* DENOTES UNAVAILABLE DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USE THE GUIDE TO HEAR MONTHLY PERFORMANCE REPORTS, 1978, SOLAR/10004-78/19

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY SUMMARY

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: MARCH, 1970

SOLAR/1034-70/03

SITE/SYSTEM DESCRIPTION:

THE SOLAR ENERGY SYSTEM PROVIDES FOR SPACE HEATING OF A SINGLE FAMILY DWELLING. THE SYSTEM ALSO PROVIDES ENERGY TO AN 80 GALLON HOT WATER PREHEAT TANK. STORAGE IS 510 CUBIC FEET OF GRAVEL. A HEAT PUMP AND ELECTRIC STRIP HEATERS PROVIDE AUXILIARY SPACE HEATING.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE
AVERAGE BUILDING TEMPERATURE
FLOSS SOLAR CONVERSION EFFICIENCY
EGSS OPERATING ENERGY
TOTAL SYSTEM OPERATING ENERGY
TOTAL ENERGY CONSUMED

15.984 GIGA JOULES
40161 KJ/SQ.M.
4.661 GIGA JOULES
117167 KJ/SQ.M.
15 DEGREES C

0.300 GIGA JOULES
0.075 GIGA JOULES
6.803 GIGA JOULES

SUBSYSTEM SUMMARY:

LOAD FRACTION
SOLAR ENERGY USED
OPERATING ENERGY
AUX. THERMAL ENG
AUX. ELECTRIC FUEL
AUX. FOSSIL FUEL
ELECTRICAL SAVINGS
FOSSIL SAVINGS

HEATING
2.718
0.393
0.636
0.330
N.A.
-0.216
N.A.

COOLING
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.

SYSTEM TOTAL JOULES
2.718 GIGA JOULES
1.4 PERCENT
0.536 GIGA JOULES
0.636 GIGA JOULES
1.165 GIGA JOULES
N.A.
-0.216 GIGA JOULES
N.A.
N.A.

SYSTEM PERFORMANCE FACTOR:

0.381

* DENOTES UNAVAILABLE DATA

2 DENOTES NULL DATA

N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PROGRAM, FEBRUARY 28, 1978, SOLAR70004-70418

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT

ENERGY COLLECTION AND STORAGE SUBSYSTEM (ETSS)

SITE: ALPHA, CONSTRUCTION COMPANY

SOLAR/1534-70/03

REPORT PERIOD: MARCH, 1975

DAY MONTH	TEMPERATURE MILLION BTU	APPROXIMATE DEGREE	ENERGY LOADS MILLION BTU	HEATING MILLION BTU	Cooling MILLION BTU	NET MILLION BTU	PERCENT OF DEMAND
1	0.056	38	0.034	0.000	0.000	0.000	0.000
2	0.164	36	0.000	0.000	0.000	0.000	0.000
3	0.178	48	0.000	0.000	0.000	0.000	0.000
4	0.108	53	0.000	0.000	0.000	0.000	0.000
5	0.208	40	0.000	0.000	0.000	0.000	0.000
6	0.101	35	0.000	0.000	0.000	0.000	0.000
7	0.056	39	0.000	0.000	0.000	0.000	0.000
8	0.064	40	0.000	0.000	0.000	0.000	0.000
9	0.064	36	0.000	0.000	0.000	0.000	0.000
10	0.064	36	0.000	0.000	0.000	0.000	0.000
11	0.064	36	0.000	0.000	0.000	0.000	0.000
12	0.064	36	0.000	0.000	0.000	0.000	0.000
13	0.064	36	0.000	0.000	0.000	0.000	0.000
14	0.064	36	0.000	0.000	0.000	0.000	0.000
15	0.064	36	0.000	0.000	0.000	0.000	0.000
16	0.064	36	0.000	0.000	0.000	0.000	0.000
17	0.064	36	0.000	0.000	0.000	0.000	0.000
18	0.064	36	0.000	0.000	0.000	0.000	0.000
19	0.064	36	0.000	0.000	0.000	0.000	0.000
20	0.064	36	0.000	0.000	0.000	0.000	0.000
21	0.064	36	0.000	0.000	0.000	0.000	0.000
22	0.064	36	0.000	0.000	0.000	0.000	0.000
23	0.064	36	0.000	0.000	0.000	0.000	0.000
24	0.064	36	0.000	0.000	0.000	0.000	0.000
25	0.064	36	0.000	0.000	0.000	0.000	0.000
26	0.064	36	0.000	0.000	0.000	0.000	0.000
27	0.064	36	0.000	0.000	0.000	0.000	0.000
28	0.064	36	0.000	0.000	0.000	0.000	0.000
29	0.064	36	0.000	0.000	0.000	0.000	0.000
30	0.064	36	0.000	0.000	0.000	0.000	0.000
31	0.064	36	0.000	0.000	0.000	0.000	0.000
SUM	15.161		0.000	0.000	0.000	0.000	0.000
AVG	0.489	41	0.016	0.000	0.000	0.000	0.000
MAX MIN	0.001	31 3					

* DELETED UNAVAILABLE DATA.

3. DELETED UNAVAILABLE DATA.

N.A. = NOT AVAILABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT COLLECTOR ARRAY PERFORMANCE

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: MARCH, 1970
SOLAR/1034-70/03

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.256	0.077	0.027	40	0.020
2	0.164	0.068	0.024	38	0.027
3	0.728	0.274	0.051	58	0.069
4	0.168	0.140	0.060	56	0.034
5	0.120	0.055	0.007	47	0.003
6	0.191	0.062	0.008	37	0.004
7	0.822	0.440	0.232	54	0.046
8	0.541	0.322	0.150	50	0.045
9	0.372	0.338	0.011	39	0.034
10	0.284	0.093	0.015	17	0.059
11	0.575	0.500	0.103	33	0.033
12	0.166	0.032	0.006	37	0.045
13	0.513	0.352	0.030	23	0.015
14	0.898	0.865	0.320	35	0.086
15	0.445	0.411	0.151	57	0.036
16	0.453	0.409	0.139	55	0.037
17	0.888	0.867	0.309	55	0.036
18	0.594	0.563	0.343	60	0.041
19	0.334	0.287	0.261	61	0.026
20	0.056	0.040	0.000	71	0.000
21	0.254	0.105	0.000	77	0.000
22	0.250	0.063	0.000	46	0.000
23	0.735	0.634	0.162	48	0.056
24	0.272	0.246	0.038	37	0.033
25	0.210	0.189	0.066	46	0.035
26	0.110	0.027	0.007	64	0.017
27	0.164	0.027	0.007	51	0.004
SUM	15.151	12.992	4.420	-	-
AVG	0.480	0.419	0.143	47	0.202
NBSTD	0001		0100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT STORAGE PERFORMANCE

SITE: ALPHA CONSTRUCTION COMPANY SOLAR/1034-79/03
REPORT PERIOD: MARCH, 1979

DAY MONTH	ENERGY STORAGE MILLION BTU	ENERGY STORAGE MILLION BTU	CHANGED ENERGY MILLION BTU	STORAGE TEMP DEG F	EFFICIENCY
1	0.007	0.034	-0.174	77	1.000
2	0.026	0.000	0.023	77	0.937
3	0.054	0.000	0.173	82	0.458
4	0.054	0.000	-0.004	88	0.066
5	0.007	0.000	-0.026	87	-0.480
6	0.007	0.000	-0.047	84	-0.480
7	0.007	0.000	0.144	88	0.540
8	0.007	0.028	-0.095	88	0.402
9	0.012	0.045	-0.166	100	0.167
10	0.012	0.053	-0.153	91	-0.129
11	0.012	0.077	-0.172	76	-0.192
12	0.012	0.077	0.173	87	0.230
13	0.012	0.077	-0.084	87	-0.230
14	0.012	0.077	-0.084	88	-0.230
15	0.012	0.077	-0.084	88	-0.230
16	0.012	0.077	-0.084	88	-0.230
17	0.012	0.077	-0.084	88	-0.230
18	0.012	0.077	-0.084	88	-0.230
19	0.012	0.077	-0.084	88	-0.230
20	0.012	0.077	-0.084	102	0.311
21	0.012	0.077	-0.084	105	0.352
22	0.012	0.077	-0.084	114	0.342
23	0.012	0.077	-0.084	120	0.307
24	0.012	0.077	-0.084	111	0.157
25	0.012	0.077	-0.084	111	-0.300
26	0.012	0.077	-0.084	104	-0.748
27	0.012	0.077	-0.084	88	-0.988
28	0.012	0.077	-0.084	88	-0.046
29	0.012	0.077	-0.084	82	-0.354
30	0.012	0.077	-0.084	82	0.171
31	0.012	0.077	-0.084	82	-0.261
SUM	4.149	0.371	-0.002	-	-
AVG	0.134	0.012	-0.000	83	0.389
NBS ID	0200	0201	0202	-	N108

* DENOTES UNAVAILABLE DATA.
 ? DENOTES NULL DATA.
 N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: MARCH, 1979

SOLAP/1034-7a/03

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR PR. OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.000	0.000	0.000	0.003	0.010	0.010	0.010	0.003	0.003	52	52	0
2	0.000	0.000	-0.002	0.010	0.010	0.010	0.010	-0.010	-0.010	52	52	0
3	0.000	0.000	-0.001	0.006	0.010	0.010	0.010	-0.006	-0.006	52	52	0
4	0.000	0.000	0.002	0.004	0.010	0.010	0.010	-0.004	-0.004	52	52	0
5	0.000	0.000	0.001	0.011	0.010	0.010	0.010	-0.001	-0.001	52	52	0
6	0.000	0.000	0.013	0.007	0.010	0.010	0.010	-0.007	-0.007	52	52	0
7	0.000	0.000	0.002	0.008	0.010	0.010	0.010	-0.002	-0.002	52	52	0
8	0.000	0.000	-0.002	0.001	0.010	0.010	0.010	-0.001	-0.001	52	52	0
9	0.000	0.000	-0.001	0.001	0.010	0.010	0.010	-0.001	-0.001	52	52	0
10	0.000	0.000	0.011	0.001	0.010	0.010	0.010	-0.001	-0.001	52	52	0
11	0.000	0.000	0.003	0.001	0.010	0.010	0.010	-0.003	-0.003	54	54	0
12	0.000	0.000	-0.001	0.001	0.010	0.010	0.010	-0.001	-0.001	54	54	0
13	0.000	0.000	0.002	0.001	0.010	0.010	0.010	-0.002	-0.002	54	54	0
14	0.000	0.000	0.004	0.001	0.010	0.010	0.010	-0.004	-0.004	54	54	0
15	0.000	0.000	0.006	0.001	0.010	0.010	0.010	-0.006	-0.006	54	54	0
16	0.000	0.000	0.004	0.001	0.010	0.010	0.010	-0.004	-0.004	54	54	0
17	0.000	0.000	0.012	0.012	0.011	0.011	0.011	-0.012	-0.012	55	55	0
18	0.000	0.000	0.010	0.006	0.011	0.011	0.011	-0.010	-0.010	57	57	0
19	0.000	0.000	0.001	0.003	0.009	0.009	0.009	-0.003	-0.003	57	57	0
20	0.000	0.000	0.000	0.001	0.002	0.002	0.002	-0.001	-0.001	57	57	0
21	0.000	0.000	0.010	0.011	0.001	0.001	0.001	-0.010	-0.010	57	57	0
22	0.000	0.000	0.003	0.009	0.008	0.008	0.008	-0.003	-0.003	57	57	0
23	0.000	0.000	0.001	0.008	0.008	0.008	0.008	-0.001	-0.001	57	57	0
24	0.000	0.000	0.000	0.001	0.009	0.009	0.009	-0.000	-0.000	57	57	0
25	0.000	0.000	0.000	0.001	0.012	0.012	0.012	-0.000	-0.000	57	57	0
26	0.000	0.000	0.000	0.001	0.011	0.011	0.011	-0.000	-0.000	57	57	0
27	0.000	0.000	0.000	0.001	0.011	0.011	0.011	-0.000	-0.000	57	57	0
28	0.000	0.000	0.003	0.008	0.008	0.008	0.008	-0.003	-0.003	57	57	0
29	0.000	0.000	0.000	0.008	0.008	0.008	0.008	-0.000	-0.000	57	57	0
30	0.000	0.000	0.000	0.001	0.009	0.009	0.009	-0.000	-0.000	57	57	0
31	0.000	0.000	0.000	0.000	0.009	0.009	0.009	-0.000	-0.000	57	57	0
SUM	0.000	-	0.136	0.205	0.312	0.312	N.A.	-0.205	N.A.	-	-	0
AVG	0.000	-	0.004	0.007	0.010	0.010	N.A.	-0.007	N.A.	54	54	0
NPS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SPACE HEATING SUBSYSTEM

REPORT PERIOD: MARCH, 1970

SOLAR/1034-79/03

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FUEL LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG THERM DEG.	AIR TEMP DEG.
1	0.127	28	0.034	0.020	0.020	0.028	NOT APPLICABLE	0.013	NOT APPLICABLE	50	39
2	0.090	0	0.000	0.030	0.047	0.064	NOT APPLICABLE	0.064	NOT APPLICABLE	59	34
3	0.090	0	0.000	0.015	0.025	0.033	NOT APPLICABLE	0.000	NOT APPLICABLE	59	34
4	0.076	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	60	33
5	0.201	0	0.000	0.013	0.018	0.025	NOT APPLICABLE	0.000	NOT APPLICABLE	59	30
6	0.116	0	0.000	0.034	0.051	0.070	NOT APPLICABLE	0.000	NOT APPLICABLE	59	30
7	0.130	96	0.000	0.004	0.031	0.041	NOT APPLICABLE	0.000	NOT APPLICABLE	61	40
8	0.040	100	0.028	0.004	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	60	34
9	0.066	82	0.040	0.010	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	59	34
10	0.345	6	0.055	0.010	0.002	0.003	NOT APPLICABLE	0.000	NOT APPLICABLE	57	34
11	0.144	100	0.011	0.026	0.032	0.044	NOT APPLICABLE	0.000	NOT APPLICABLE	59	34
12	0.130	9	0.040	0.004	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	57	34
13	0.130	3	0.002	0.019	0.028	0.036	NOT APPLICABLE	0.000	NOT APPLICABLE	57	34
14	0.133	100	0.037	0.036	0.040	0.050	NOT APPLICABLE	0.000	NOT APPLICABLE	57	34
15	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	58	34
16	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	60	48
17	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	60	48
18	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	64	51
19	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	64	51
20	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	66	57
21	0.000	22	0.016	0.012	0.014	0.019	NOT APPLICABLE	0.000	NOT APPLICABLE	61	46
22	0.112	0	0.018	0.035	0.048	0.064	NOT APPLICABLE	0.000	NOT APPLICABLE	55	35
23	0.157	16	0.041	0.009	0.024	0.032	NOT APPLICABLE	0.000	NOT APPLICABLE	56	37
24	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	59	35
25	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	63	52
26	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	63	52
27	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	63	52
28	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	63	52
29	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	63	52
30	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	63	52
31	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	NOT APPLICABLE	63	52
SUM	2.576	-	0.372	0.435	0.603	0.702	N.A.	0.142	N.A.	-	-
AVG	0.083	14	0.012	0.014	0.019	0.026	N.A.	0.005	N.A.	50	41
NRS	0402	N400	0400	0403	0401	0410	0410	0415	0417	N406	N113

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENVIRONMENTAL SUMMARY

SITE: ALPHA CONSTRUCTION COMPANY
REPORT PERIOD: MARCH, 1979

SOLAR/1034-79/03

DAY MONTH	TOTAL INSULATION BTU/SQ. FT.	DIFFUSE INSULATION BTU/SQ. FT.	TEMPERATURE DEG. F.	DAYTIME AMBIENT DEG. F.	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	131	NOT	38	40	NOT	NOT	NOT
2	183		36	39			
3	1690		48	58			
4	1662		53	56			
5	697		40	43			
6	447		35	37			
7	1927		30	54			
8	2034		40	54			
9	1264		30	50			
10	1869		34	39			
11	662		16	17			
12	2041		27	33			
13	1341		43	53			
14	1387		37	34			
15	1199		18	20			
16	2291		41	37			
17	2095		50	55			
18	1057		48	55			
19	1992		51	50			
20	306		51	51			
21	183		57	71			
22	1203		62	68			
23	637		32	35			
24	1716		25	27			
25	1637		38	31			
26	1716		57	48			
27	635		37	46			
28	505		62	66			
29	258		52	51			
SUM	35366	N.A.	-	-	-	-	-
AVG	1141	N.A.	41	47	N.A.	N.A.	N.A.
NRS ID	0001		N113		N115		N114

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